

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today
(1) was not written for publication in a law journal and
(2) is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MASANOBU IWASAKI
and KATSUHIRO TSUKAMOTO

Appeal No. 96-0633
Application 07/971,041¹

ON BRIEF

Before URYNOWICZ, THOMAS and KRASS, Administrative Patent Judges.

THOMAS, Administrative Patent Judge.

DECISION ON APPEAL

Appellants have appealed to the Board from the examiner's final rejection of claims 1 to 15 and 19 to 23. Claims 16 through 18 and 24 through 27 relate to a nonelected invention made subject to a restriction requirement.

¹ Application for patent filed November 3, 1992.

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Independent claim 1 is reproduced below:

1. A semiconductor wafer structure comprising:

a semiconductor substrate including a plurality of semiconductor device regions each of bearing a semiconductor device, and a plurality of dicing line regions separating said device regions;

an insulation layer of a first material on a surface of said substrate, wherein said insulation layer has a plurality of apertures, each aperture surrounding a respective one of said device regions and electrically isolating each said device region from the others; and

said apertures are each filled with a layer of a second material confined to be within said aperture.

The following references are relied by the examiner:

Esquivel et al. (Esquivel)	4,977,439	Dec. 11, 1990
Asano et al. (Asano)	5,128,744	July 7, 1992
		(filed Sept. 12, 1989)
Ishii et al. (Ishii)		
(Japanese Kokai)	2-211652 ²	Aug. 22, 1990

Claims 1 to 15 and 19 to 21 stand rejected under 35

U.S.C.

² Our understanding of this reference is based upon a translation provided by the Scientific and Technical Information Center of the Patent and Trademark Office. A copy of the translation is included with this opinion.

§ 103. As evidence of obviousness, the examiner relies upon Ishii in view of Asano. Additionally, the examiner has separately rejected under 35 U.S.C. § 103 all claims on appeal, claims 1 to 15 and 19 to 23, in view of the collective teachings of Ishii in view of Asano, further in view of Esquivel.

Rather than repeat the positions of the appellants and the examiner, reference is made to the briefs and the answer for the respective details thereof.

OPINION

At the outset, we note that appellants' summary of the invention at pages 2 and 3 of the brief correlates certain portions of the disclosed first embodiment to various figures and descriptive portions of the written specification as well as the second embodiment. As an example, appellants correlate the disclosed first embodiment to independent claim 1 on appeal and the disclosed second embodiment to independent claim 4 on appeal.

Following this approach, independent claims 1, 5, 11 and 19 relate to the disclosed first embodiment, while independent claims 4, 8 and 12 relate to the disclosed second embodiment.

Essentially, the claimed first embodiment recites either a single or plurality of apertures, each surrounding a respective one of a claimed device region. On the other hand, the claimed second embodiment recites features analogously in the form of a plurality of openings, each surrounding a respective device region.

Initially, we reverse the rejection of independent claims 4, 8 and 12 in as much as these claims recite the disclosed second embodiment requiring a plurality of openings surrounding a device region, further where each opening is separated from adjacent openings by the first insulating layer material and each of which is also filled with a layer of second material confined to be within the opening. We agree with appellants' basic assertion as to these claims in the brief and reply brief that no single reference and certainly no combination of the teachings or suggestions of the references relied upon by the examiner would have taught or suggested to the artisan the claimed plurality of openings surrounding this device region recited in each of these independent claims. It appears that the examiner has not come to grips with the distinction of these claims relative to the

subject matter of the other claims on appeal relating to the first embodiment.

The remaining claims on appeal all relate to the disclosed first embodiment which essentially recite either a single or plurality of apertures each surrounding a respective one of a device region. The examiner essentially relies upon Ishii's figure 4 as the base reference to which to take the position that the artisan would have found it obvious to modify in light of the collective teachings of Asano according to the first rejection or Asano and Esquivel as to the second rejection. The examiner's position relies upon figure 4 of Ishii but appellants' statement at page 4 of the brief recognizes that figure 1 of this reference discloses a device region 11 and a dicing region 12 which are separated by trench 7 surrounding the device region 11 and also which are filled with a wiring film layer 4 which extends into the dicing region. Figure 1 of Ishii shows that first wiring layer 4 of tungsten (as taught at the bottom of page 12 of the translation) not only fills the first groove 7 located in the first insulation layer 3 but also extends over the middle portion thereof to connect the other groove shown in that

figure, all of which are located within the dicing line part 12. A similar feature is shown in figure 3 of this reference with the additional showing of a second groove 8 in the insulation layer 5 filled in like manner, all on top of the filled groove region 7. In contrast, the figure 4 embodiment does not show that the second groove 8 is filled in the dicing line region 12 but remains empty. The examiner relies upon the additional teachings of Asano and Asano and Esquivel to fill this empty or unfilled second groove 8 in figure 4 of Ishii as best expressed at the bottom of page 2 of the Advisory Action, mailed on September 26, 1994.

Of the claims remaining after our reversal of the rejection of claims 4, 8 and 12, we sustain both rejections only of claims 1 through 3, 5 through 7, 9 and 10 based upon the figure 1 and 3 versions of Ishii and finding at the same time that the additional teachings relied upon by the examiner in Asano or Esquivel are cumulative as to those already set forth in Asano as to these claims. Appellants' brief and reply brief continue to characterize the figure 1 and essentially in effect the figure 3 embodiments that respective first and second grooves 7 and 8 are filled with a layer of

material which extends into the dicing region. There is no apparent distinction to us of claim 1 on appeal over the substance of these figures in Ishii except for perhaps the argued feature just set forth by appellants. This has not been quoted in the brief but the last clause of independent claim 1 on appeal, for example, recites that the apertures are each filled with a layer of a second material "confined to be within the aperture." A similar limitation is set forth at the end of broader independent claim 5 on appeal. We do not construe the statement of this feature in each of these claims as being equivalent to stating that the filling must be confined only within said aperture. Appellants' argument as to this feature is best expressed at the bottom of page 3 of the reply brief where appellants indicate that Ishii teaches the use of a trench "which is filled with material which extends into the dicing region (i.e., the fill material is not confined within the aperture or formed only in the trench and the device forming region)." Such an explicit limitation is not recited at the end of independent claims 1 and 5 on appeal. Again, there is no recitation in these claims that the fill material is confined only within the aperture or

formed only in the trench in the device forming region. Appellants' characterization of Ishii at page 4 of the principal brief on appeal already recognizes that with respect to figure 1 the so-called trench 7 surrounds the device region 11 as set forth in independent claims 1 and 5 on appeal.

At the bottom of page 4 of the reply brief appellants argue that claims "2 and 6 include apertures filled with a layer of material confined within the aperture." Claims 2 and 6 recited identical subject matter but different parent claims and, instead of the characterization at page 4 of the reply brief as just set forth by appellants, merely recite that the second material is capable of completely filling the aperture and providing an interface with the insulation layer. Ishii's Figures 1 and 3 show such. There is no more particular recitation in dependent claims 2 and 6 of the feature argued by appellants as to that expressed in the parent claims 1 and 5 on appeal. We also note that there are no particulars argued with respect to dependent claims 3, 7, 9 and 10. Therefore, we sustain both rejections of claims 1 through 3, 5 through 7, 9 and 10.

We also reverse the rejection of independent claim 11 and its dependent claims 13 through 15. Although claim 11 (and independent claim 19 which we will treat separately shortly) recites no comparable dicing region as does independent claim 1 on appeal, the claimed "a filling layer of a second material formed only in said aperture and on the insulating layer in the device forming region" is not taught or suggested in our view in Ishii alone or in light of Asano or Ishii and Asano further in view of Esquivel. The other parts of independent claim 11 on appeal have essentially been duplicated in the other claims for which we have sustained the rejection.

On the one hand, while figures 1 and 3 of Ishii teach and show that the tungsten wiring material is within the respective trenches 7 and 8, it is not shown or described to be "only" within these regions and, at the same time, figures 1 and 3 do not depict the characterization of the insulating layer and the filling material in the device or element forming part 11 in these figures. On the other hand, the figure 4 version of this reference may be characterized as containing a filling layer as argued by the examiner in the device forming region 11 but the disclosed second aperture 8

in this figure of Ishii has not been filled with any material required by the initial part of the filling layer clause of claim 11 on appeal. The translation at page 12 of Ishii relating to the figure 4 embodiment indicates that the "second groove (8) is not concealed by the second wiring film (10) formed in the second insulation film (6)." This appears to be a translation misstatement in relying upon the use of the word "concealed" where, according to the figure itself, the second groove is not filled by a second wiring film 10.

In any case, we find the secondary references to Asano and Esquivel not to have suggested to the artisan the concept of filling the second groove 8 in the figure 4 version of Ishii as argued by the examiner. The examiner's rationales expressed best at the top of pages 4 and 5 of the statement of the rejection portion of the answer essentially are conclusory and not reasoned out. The responsive arguments portion of the answer beginning at page 5 of the answer does not also otherwise persuade us of the obviousness of the subject matter of claim 11 on appeal in light of the additional teachings of Asano and Esquivel respectively. As such, we reverse the

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rejection of claim 11 and its respective dependent claims 13 through 15.

Finally, we reverse the rejection of claim 19 and its respective dependent claims 20 through 23 essentially for the same reasons we reversed the rejection of claim 11. The claimed first filling layer recites the subject matter essentially in the same manner as recited for the filling layer of independent claim 11 on appeal. Additionally, we would be hard pressed to agree with the examiner's rationale as to the second filling layer of a conductive material being formed only in the second aperture as set forth at the end of claim 19 on appeal for similar reasons.

In view of the foregoing, to the extent claims 1 to 15 and 19 to 23 stand rejected under 35 U.S.C. § 103, we sustain the two separate rejections only as to claims 1 through 3, 5 through 7, 9 and 10. Therefore, the examiner's decision is affirmed-in-part.

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No time period for taking any subsequent action in
connection with this appeal may be extended under 37 CFR
§ 1.136(a).

AFFIRMED-IN-PART

	STANLEY M. URYNOWICZ, JR.)	
	Administrative Patent Judge)	
)	
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)	
	JAMES D. THOMAS)	BOARD OF
PATENT	Administrative Patent Judge)	APPEALS AND
)	INTERFERENCES
)	
	ERROL A. KRASS)	
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